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UNITED STATES PATENT APPLICATION

of

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for

DISPOSABLE TIP MAGAZINE

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BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to automated pipetting systems, and is concerned in particular with
5 the provision of a low-cost disposable magazine for loading pipette tips into such systems.

2. Description of the Prior Art

This invention is especially adapted for, although not limited to, use with the
PLATEMATE™ pipetting systems marketed by Matrix Technologies Corp. of Hudson, New
10 Hampshire, U.S.A. Such systems employ rigid metal magazines such as aluminum, for the
pipette tips. The steel magazines are expensive components and are thus continually reused in
successive pipetting cycles. Magazine reuse inevitably requires laboratory personnel to frequently
empty and refill them with fresh pipettes. This has been found to be a time consuming, inefficient
and cumbersome procedure, but one that was deemed necessary because of the belief that only
15 steel magazines could provide the rigidity required to resist deflection during the pipetting process.

During the pipetting process, in order to ensure a uniform seal across all of the pipette tips
in the magazine, substantial force must be exerted on the magazine. If the magazine is not rigid
enough, there will be some deflection across the face of the magazine.

It is important that the magazine be as flat as possible. If there is too much deflection, all
20 of the faces of the pipette tips will not adequately seal, causing an air leak and thus uneven
pipetting. The automated pipettor may be used to dispense samples into 96, 384 or 1536 well
plates. It is extremely important that the pipettes be perpendicular to the magazine. If there is

too much deflection and the pipette tips are slightly angled, the sample will be pipetted into an incorrect well or on a wall causing cross contamination. Precision is especially required when using the 384 or the 1536 well plates.

The objective of the present invention is to provide an improved low-cost pipette magazine
5 which may be discarded after a single use, thus accordingly, alleviating the drawbacks associated with the prior art reusable magazines.

SUMMARY OF THE INVENTION

The present invention stems from the discovery that a pipette magazine of adequate rigidity
10 and stiffness can be molded from a polymeric material, with the attendant reduction in costs being such that the magazine can be economically discarded after a single use.

BRIEF DESCRIPTION OF THE DRAWINGS

Other objects, features and advantages of the present invention will become more apparent
15 as the description proceeds with reference to the accompanying drawings, wherein:

Fig. 1 is a top plan view of a pipette tip magazine in accordance with the present invention;

Fig. 2 is a bottom plan view of the pipette tip magazine;

Fig. 3 is a front view of the pipette tip magazine;

20 Fig. 4 is a left side view of the pipette magazine;

Fig. 5 is a sectional view taken along line 5-5 in Fig. 1; and

Fig. 6 is a schematic illustration of a pipetting system and its arronated pipette tip magazine.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENT

5 A preferred embodiment of a pipette tip magazine in accordance with the present invention is generally depicted at 10 in the accompanying drawings. As shown somewhat schematically in Figure 6, the magazine 10 is adapted for insertion into the pipetting chamber "C" of an automated pipettor. The chamber has a generally U-shaped ledge configured to support the magazine in an operative pipetting position, as well understood by those skilled in the art. The magazine 10 has
10 a generally rectangular configuration having a front edge 12a, side edges 12b, 12c and a rear edge 12d surrounding an inner region 14. The edges 12b, 12c and 12d are undercut as at 13 to be supported on the ledge of the chamber. The inner region 14 has an array of through openings 16 for vertically receiving and retaining pipette tips. A handle 18 protrudes from the front edge 12a to facilitate manual placement and removal of the magazine in the pipetting chamber C.

15 It has been found that the magazine 10 can be molded from a polymeric resin with sufficient inherent stiffness such that when the magazine is supported in its operative position on
leg of
17 ledge 11, a downward force of up to approximately 1000 Newtons exerted on the inner region 14 will cause less than .51 mm of deflection, but preferably less than .38 mm of deflection at the point of force application, assuming the magazine was substantially flat when molded. Preferably,
20 the polymeric resin will comprise a polycarbonate, which may include a filler such as glass fiber. The percentage of glass fiber to the polymeric material is preferably in a range of approximately 20 to 40 weight percent. Because the magazine is molded from a filled polymeric resin, it is

relatively inexpensive, and thus may be discarded after a single use. Thus, the magazine may be supplied already filled with pipette tips and disposed after usage, thus obviating any need to resort to cumbersome time consuming reloading.

Preferably, the inner region 14 of the magazine comprises approximately 85% of the total
5 surface area, with the remaining 15% comprising the edge region overlying the undercut 13
adapted to be seated on the ledge 11.

Typical dimensions for a suitable magazine are:

Total surface area: 98.5 cm²

Width of undercut 13: .51 cm

10 Area supported on ledge 11: 14.3 cm²

Maximum thickness: .90 cm

Bosses 22 may be included on the underside of the magazine to assist in the stacking of loaded magazines for packaging, such that they are easily displaced one from the other.

15 The foregoing description has been limited to a specific embodiment of the invention. It will be apparent, however, that variations and modifications can be made to the invention, with the attainment of some or all of the advantages. Therefore, it is the object of the claims to cover all such variations and modifications as come within the true spirit and scope of the invention.

What is now claimed is: